D1

N81-21952

MARKETING INFORMATION: THE TECHNICAL REPORT AS PRODUCT

Dr. Freda F. Stohrer, Assistant Professor
Department of English
Old Dominion University
Norfolk, Virginia 23508

and

Thomas E. Pinelli, Assistant Chief
Scientific and Technical Information Programs Division
NASA Langley Research Center
Hampton, Virginia 23665

ABSTRACT

For many R&D agencies of the federal government, including the National Aeronautics and Space Administration (NASA), the technical report constitutes a product, the primary means for communicating the results of their research to the user. The present environment of the technical report is vast, with considerable variance in report components, format, and organization. As part of the Langley scientific and technical information (STI) review and evaluation project, a review of the technical report as an effective product for information communication was undertaken. Style manuals describing theory and practice in technical report preparation; publication manuals covering such factors as design, layout, and type style; and copies of technical reports were obtained from industrial, academic, governmental, and research organizations. Based on an analysis of this material, criteria will be established for the report components, for the relationship of the components within the report context, and for the overall report organization. The criteria will be used as as bench marks and compared with the publication standards currently used to prepare NASA technical reports. The comparison may reveal changes which can be made to the existing NASA standards to improve the effectiveness of NASA's technical reports as products for information communication.

INTRODUCTION

The research and development (R&D) expansion,which began during World War II,resulted in significant changes in scientific and technical information (STI) activities in the United States. These changes, which were necessary to handle the increased production of STI, included new methods of publishing, disseminating, storing, and retrieving scientific and technical information. A significant change occurred in the way in which the results of research were published. During this period, the distribution of R&D activities changed from a

Preceding page blank

PRECEDING PAGE BLANK NOT FILMED

complete reliance on traditional journals and monographs to the widespread use of the technical report (Adkinson, 1978).

Growth of Technical Report Literature

The technical report has also been used by industry to communicate significant and complete research results. Due primarily to the federal government's support of R&D activities and the associated need to record the progress and document the results of government-sponsored research, the volume of technical report literature has grown steadily. Approximately 15,000 technical reports were produced in 1965. A decade later, in 1975, the yearly total exceeded 60,000 reports. The projected production for 1980 was established at 80,000 reports (King, 1977). The number of U.S. scientific and technical literature items by medium is shown in Table A.

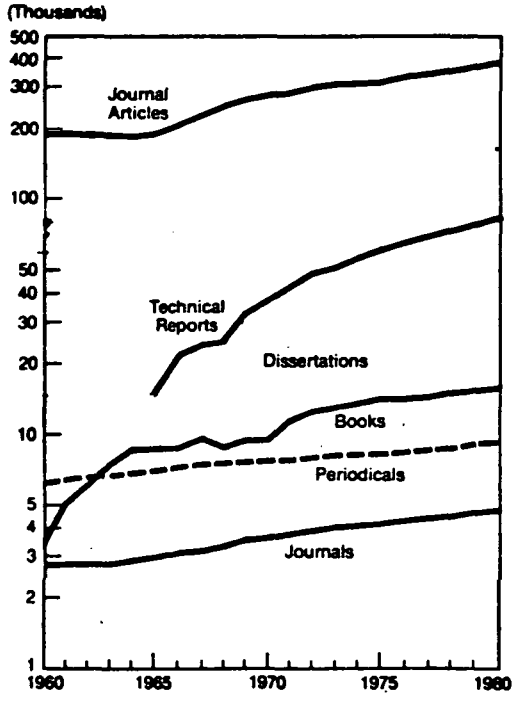

Table A.- Number of U.S. S&T literature items by medium (1960-1980).

For calendar year 1980, the National Aeronautics and Space Administration published 3,399 technical reports. Like many R&D agencies in the federal government, NASA regards the technical report as a product, the primary means of communicating research results to the user. As a primary means of communicating

PRECEDING PAGE BLANK NOT FILMED

technical information, NASA technical reports must be organized and written to accomplish the most effective communication of its contents.

NASA technical reports are processed into the NASA scientific and technical information system where they are distributed to industrial, academic, and public organizations; accessioned into RECON, NASA's computerized bibliographic data base; and indexed and abstracted in STAR, NASA's announcement publication for technical report literature. The NASA technical publications which are available for sale to the public can be obtained from the National Technical Information Service (NTIS) in Springfield, Virginia.

The National Technical Information Service was established as part of the Department of Commerce to simplify and improve public access to scientific and technical reports produced by federal agencies and their contractors. NASA technical reports, as well as those of other federal R&D agencies, are added to the NTIS data base. The NTIS data base may be searched through such commercial data bases as SDC's ORBIT III, Lockheed/DIALOG, and BRS.

Technical Report as Product

The technical report is a tangible product of a research effort. Although agreement exists that these reports should be organized, clearly worded, and easy to use, report producers disagree on (1) the definition of the technical report, (2) the role of the technical report in the scientific and technical environment, and (3) the arrangement of the parts of the technical report.

The definition of the technical report varies because it serves different roles in communication within and between organizations. The technical report can be defined etymologically, according to the derivation of "report" (Weisman, 1966); descriptively, according to the report content and method (DoD, 1964); behaviorally, according to the influence on the reader (Ronco, 1965); and rhetorically, according to the function of the report within a system for communicating scientific and technical information (Mathes and Stevenson, 1977).

In 1968, COSATI (Committee on Scientific and Technical Information) assembled a task group which appraised the role of the technical report in the scientific and engineering communication process. The technical report was found to be the primary recording medium for applied research and thus favored

by the technologists. The technologists saw great merit in a number of features of the technical report including 1) timeliness, 2) comprehensive treatment, 3) inclusion of ancillary information, and 4) the frequent inclusion of negative results. On the other hand, the COSATI study found that scientists questioned the reliability of the technical report because of its allegedly unreviewed nature and its availability in terms of access through a retrieval or archival system.

Publications manuals representing a cross-section of the scientific and technical community were examined in an attempt to discover a standard arrangement of components recommended for inclusion in a technical report. There was little agreement about the inclusion or the arrangement of components. The matrix illustrating the variety in these documents is included as an appendix.

STATEMENT OF THE PROBLEM

In February 1980, the Scientific and Technical Information Programs Division undertook the first comprehensive review and evaluation of the Center's STI program. As part of the project, a study of the technical report was undertaken to determine whether the NASA publication standards of style and organization made the technical report an effective product for transmitting information.

Purpose of the Study

NASA employs uniform publication standards designed to ensure the clarity, quality, and utility of its technical reports. These standards were designed to produce reports of maximum readability and ease of comprehension, written in a style that is both logical and familiar because of its wide acceptance in technical writing. However, an evaluation of NASA publication standards had never been conducted.

Importance of the Study

A survey of the literature disclosed that little, if any, documented research existed to support or suggest criteria for assessing the effectiveness of a technical report. Consequently, a survey to establish the present environment of the technical report and to produce empirical data against which NASA publication standards could be compared was deemed essential. This paper reports the preliminary findings of the study.

RESEARCH METHODOLOGY AND PROCEDURE

The study utilized survey research to obtain input from organizations which were known to produce technical information. Addresses were compiled from two sources: the Society for Technical Communication (STC) membership and NASA's distribution list for technical reports. The study was conducted in conjunction with the firm of Graffic Traffic Studios, located in Norfolk, Virginia.

Limitations of the Study

For purposes of this study, the technical report was defined as a communication product designed to convey the comprehensive results of basic and applied research together with the ancillary information necessary for interpretation, replication, or application of the results or techniques. The study was limited to those technical reports which recorded significant scientific or technical accomplishments and which were specifically prepared for distribution outside of the originating organization. Thus, in-house memo/letter reports, the corporate "proposal", institutional reports such as periodic reports or annual reports, and the contract progress report were eliminated.

Procedure

A letter was sent to individuals representing 611 organizations in industry; academia; government; and research, trade, and professional associations. The individuals were asked to provide the following:

1. Copies of typical reports published by their organizations;

2. A copy of their style manual or the name of the commercially prepared manual (e.g., Chicago Manual of Style) if one is used;

3. A copy of the publications or graphics manual or standards covering such factors as design, layout, typography style, illustrative material, printing, binding; and

4. A form indicating the absence or presence of the requested information.

Approximately 200 pieces of literature were received from 124 organizations within the established time limits. Ninety-nine technical reports were suitable for analysis and data extraction. The data were analyzed according to established criteria. No statistical inferences were made from the findings.

FINDINGS

Of the 611 organizations contacted, 99 respondents sent material suitable for analysis and data extration. The overall rate of return for the survey was 16.3%.

Survey Response

The 99 responses were grouped according to organization. The largest group in the survey population was the industrial organizations; followed by the research, trade, and professional organizations; government organizations; and the academic organizations. This grouping is shown in Table B.

Organizational Type	Requests	Responses	Percent Responding	Percent of Total Survey
Government	49	12	26.6	12.2
Industrial	426	54	12.6	54.5
Academic	76	11	14.4	11.1
Research, Etc.	60	22	36.6	22.2
TOTALS	611	99	16.3	100.0

Table B. - Survey responses by organization

Components - Their Use and Location

The material was analyzed to produce an exhaustive list of report components. Ninety-eight report producers described structural components using 98 different terms. In compiling the list, those terms which appeared to describe components having the same function were grouped. An analysis of the frequency of usage of the components disclosed that only five components were used by 50% or more of the responding organizations (see Table C).

Next, the material was analyzed to determine the location of the components within the report. No standard sequence was discovered, because the components were located in almost every possible position within the report. No convention was discovered for describing the various sections of the technical report. Therefore, the three areas of traditional book publishing: front matter, body, and back matter were used to locate the components. (The front matter consists of all material preceding the main text. The body contains the investigative, analytical, or

theoretical material. The back matter consists of reference material and other supplementary matter.)

Five components (cover, title page, table of contents, Introduction, and Appendixes) were mentioned by 50% or more of the respondents. Only the cover and the table of contents were consistent in their location within the report. Less agreement existed about the location of the title pages, Introduction, or Appendixes.

The components in the exhaustive listing were refined so that they could be compared more easily with the components covered by the NASA Publications Manual. Components which appeared to have the same function were combined. For example, "List of Drawings" was combined with "List of Figures." Any component mentioned by NASA was included. The number of components was reduced by eliminating any component used by fewer than five report producers.

The components derived from the exhaustive list were compared with the components and their recommended placement as specified in the NASA Publications Manual. The components and their placement as specified by NASA compared favorably to those contained in the refined list. The analysis did reveal variations in the number and placement of front matter components. Where body components were concerned, NASA placed the same elements in the body of the report as those contained in the refined list. A comparison of back matter components revealed certain variations, most notable in the placement of the glossary and index.

A breakdown of the five components, the percentage of use, and their location within the report is presented in Table C.

Component	%Use	Front	Body	Back
Cover	67.6	100.0	---	---
Title Page	80.0	96.2	2.5	1.2
Table of Contents	70.7	100.0	---	---
Introduction	57.5	17.5	82.4	---
Appendixes	59.5	---	1.6	98.3

Table C.- Components by use and location

Use of Style Manuals and Publication Guides

The respondents were asked to provide information relative to the use/non-use of style manuals and publication/production guides. Respondents were also

asked to identify the use of commercially prepared style manuals. The responses were compiled and are presented in Table D. While the chart is phrased in use/non-use terms, mutually exclusive categories were not specified. Therefore, the percentages cannot be added to describe 100% of the sample.

	Chicago	AP	GPO	*Other Commercially Available Style Guide	Your Organization's Own Style Guide	No Style Guide Used	Publication/Production Guide	Do Not Use Publication/ Production Guide
Government	16.6	16.6	83.3	33.3	41.6	25.0	58.3	41.6
Industrial	31.4	5.5	42.5	27.7	29.6	37.0	33.3	46.2
Academic	54.5	27.2	27.2	36.3	18.1	45.4	54.5	54.5
Research, Etc.	59.0	13.6	50.0	27.2	31.8	31.8	40.9	50.0
Total Survey Average	38.3	11.1	47.4	29.2	30.3	35.3	40.4	41.6

*DeBakey, The Scientific Journal: Editorial Policies and Practices (Mosby, 1976); NASA Publications Manual; NASA SP-7013; NBS Communications Manual; Abbreviation and Symbol Guide; New York Times; Reisman's Style Manual for Technical Writers and Editors; "Guidelines to Format Standards--COSATI;" STC Typing Guide for Math; American Psychological Association; Editorial Manual of the AMA; The Elements of Style; Strunk & White; Handbook of Current English; Words Into Type; CBE Style Manual; Council of Biology Editors Style Manual; Turabian: Manual for Writers; ANSI/IEEE Std 260-1978; Geological Survey Style Manual; AIP Style Manual; ACS Style Manual; SMART Communications Inc.; MLA; Fowler; Baker; UPI Style Manual; National Education Assoc.; American Institute of Physics; Technical Manual Writing Handbook; Technical Writing Style Guide; Guide for Beginning Technical Editors; Math Into Type--Swanson; Handbook for Authors-American Chemistry Society.

Table D.- Use of style manuals and publication guides by organization

The majority of respondents relied upon a style manual to prepare technical reports; however, approximately 33% of the respondents used no style manual. The GPO manual was used by the majority (83.3%) of respondents from government operations. A majority of academic and research respondents, 54.5% and 59% respectively, used the Chicago Manual of Style in report preparation. Respondents were almost evenly divided in the use/non-use of a publication/production guide.

SUMMARY OF THE STUDY

The study represents an attempt to assess the NASA technical report as an effective medium for information transmittal. The evaluation included the compilation of empirical data through a survey of report producers and through a survey of report components, formats, and organization following a study of current style manuals.

A survey of the literature disclosed that little, if any, documented research existed to support or suggest criteria for assessing the effectiveness of a technical report. Consequently, a survey designed to determine the present environment of the technical report and to produce empirical data against which NASA publication standards for technical reports could be compared was deemed essential.

During the analysis of the findings of the study, wide variances in the technical report were discovered. Nearly one hundred components were identified, based on the extensive array of terms. An attempt to reduce the number of components was made by combining similar components under one heading and the elimination of seldom used component terms. No standard sequence was discovered for the components, so only a general location for them could be made in terms of front, body, and back matter.

FUTURE RESEARCH

Future research will be devoted to assessing the adequacy of the reduced set of components, clearly defining the purpose of each component, and developing evaluative criteria for each. The components of the NASA reports will be evaluated according to these criteria. Based on the tabulation of locations in common usage, alternate theoretical sequences of components will be developed and tested empirically. The NASA report will be tested against the sequence established by research.

CONCLUSIONS

The number of technical reports has increased steadily since the expansion of R&D activities began in the U.S. during World War II. The statistics compiled by Donald King for the National Science Foundation project the continued growth of this communication medium. For many R&D agencies of the federal

government, the technical report is their product, the primary means used to transmit the results of their research to the user. Viewing the technical report as product, agencies of the federal government have created the necessary systems for disseminating, storing, retrieving, and otherwise making this medium available to the scientific and technical community.

The work by COSATI represents a significant treatment of the role of the technical report in the total STI communication process. While the work by COSATI represents a definitive treatment of the technical report, it did not address how to make the technical report more effective in communicating information to the user. The COSATI report recognized the need for, but stopped short of recommending uniform standards designed to enhance clarity, quality, and maximum utility. Many organizations such as NASA have developed publication standards to ensure clarity, quality, and utility of their reports and to prescribe the inclusion and arrangement of the components. The review of the literature revealed that bench marks for evaluating some of the components have been established. However, no critical evaluation of existing publication standards has been undertaken.

The preliminary findings of the NASA study revealed that (1) nearly one hundred components were used, (2) there was an apparent lack of consistency in the terms used for the components, and (3) there was an apparent lack of consistency in the location of the components. Further analysis and review of existing publication standards should be undertaken. Criteria for existing report components should be integrated and synthesized to establish a uniform standard for those components. Evaluative criteria should be developed for those components for which no criteria exist. Depending upon the purpose of the report and the audience, a standard for including specific report components should be established. Next, the proper sequence of the components should be determined. An empirical testing of these standards should be undertaken to ascertain the most effective choice and arrangement of components for transmitting information to the user.

REFERENCES

Adkinson, Burton W. Two Centuries of Federal Information. Stroudsburg, Pa.: Dowden Hutchinson, and Ross, Inc., 1978, p. 29.

King, Donald W. A Chart Book of Indicators of Scientific and Technical Communication in the United States. Rockville, Md.: King Research Inc., December 1977 (prepared for National Science Foundation; available GPO 038-000-00360-7), p. 7.

Weisman, Herman M. Technical Report Writing. Columbus, Ohio: Charles W. Merrill Books, Inc., 1966.

Department of Defense. Glossary of Information Handling. (after a DoD subcommittee draft of January 1964), 1964.

Ronco, P. G. Characteristics of Technical Reports that Affect Reader Behavior: A Review of the Literature. Boston: Institute for Psychological Research, Tufts University, 1965 (prepared for National Science Foundation, available NTIS PB 169 409), p. 24.

Mathes, J. C. and Stevenson, Dwight W. Designing Technical Reports. Indianapolis: The Bobbs-Merrill Co., Inc., 1976, p. 3.

Committee on Scientific and Technical Information. The Role of the Technical Report in Scientific and Technological Communication. Washington, D.C.: Federal Council for Science and Technology, December 1968 (available NTIS PB 180 944), pps. 26-29.

APPENDIX. - COMPARISION OF SIX STYLE GUIDES FOR NUMBER AND ARRANGEMENT OF COMPONENTS

COSATI	U.S. GEOLOGICAL SURVEY	HOW TO WRITE AND PUBLISH A SCIENTIFIC ARTICLE	APA PUBLICATIONS MANUAL	NATIONAL ACADEMY OF SCIENCES	NASA PUBLICATION GUIDE
Front Cover	* * *	* * *	* * *	Cover	Cover (but not described)
* * *	* * *	* * *	* * *	[Half-title page]	* * *
* * *	* * *	* * *	Title	Frontispiece	* * *
Technical Report Standard Title Page	Title Page	Title		Title page	Technical report standard title page
(with parts: abstract, authors, etc.)	(with parts: title, author)		Author		(with abstract, title, authors)
* * *	* * *	List of authors and addresses	Author's institutional affiliation	* * *	* * *
* * *	* * *	* * *	* * *	* * *	* * *
* * *	* * *	* * *	* * *	[Verso title page]	* * *
* * *	Frontispiece	* * *	* * *	* * *	* * *
* * *	Foreward	* * *	* * *	Foreword	Foreword
Preface	Preface	* * *	* * *	Preface	Preface
* * *	* * *	* * *	* * *	Acknowledgements	* * *
* * *	* * *	* * *	* * *	[Committee of panel members]	* * *
* * *	Table of contents	* * *	* * *	Letter of transmittal	* * *
Table of contents	List of illustrations	* * *	* * *	Table of contents	Table of contents
List of illustrations	List of tables	* * *	* * *	* * *	* * *
List of tables	* * *	* * *	* * *	List of tables and figures	* * *
List of abbreviations and symbols	Glossary (signs and symbols)	* * *	* * *	* * *	* * *
* * *	Abstract	Abstract	Abstract	* * *	* * *
* * *	Beginning	Introduction	* * *	* * *	[First page of text]
Introduction	Presentation of data	Materials and methods	* * *	* * *	Summary
Main text	Headings	* * *	Introduction	Introduction	Introduction
Headings	Footnotes	* * *	Method	* * *	* * *
* * *	* * *	* * *	* * *	* * *	Symbols and units
Numbering systems	* * *	* * *	* * *	Body	Main Body
* * *	* * *	* * *			Headings
* * *	The end	* * *	* * *	Headings	* * *
Conclusions	* * *	Results	* * *	Footnotes	* * *
* * *	* * *	Discussion	* * *	* * *	* * *
* * *	* * *	* * *	* * *	* * *	Descriptive information
Recommendations	Reference list	Literature cited	* * *	* * *	Mathematical presentations
Appendixes	Appendix	* * *	* * *	* * *	* * *
Glossary of terms	* * *	* * *	* * *	* * *	Results and discussion
References	* * *	Acknowledgements	Results	* * *	* * *
* * *	Index	* * *	Discussion	* * *	Concluding section
Index	Illustrations	* * *	* * *	References and notes	* * *
Illustrations	Plates		References	Bibliographies	* * *
	Figures		* * *	Appendixes	Appendixes
	Captions		Appendix	* * *	References
	Tables	* * *	* * *	Glossaries	* * *
Tables	* * *	* * *	* * *	Indexes	* * *
Equations	* * *	* * *	Tables	Tabular and graphic material	Tables
Composition	* * *	* * *		Tables	
Workmanship				Illustrations	
				Half tones	
				Figure caption	
			Figures, graphs, illustrations	* * *	Figures
					Photographs
					Drawings
					Graphs
			* * *	Mathematics	* * *
				Symbols	
				Equations	
			* * *	* * *	Numbered items
			* * *	* * *	Makeup
			* * *	* * *	Page dimensions
			* * *	* * *	Typography

Note: *** asterisks indicate the absence of a particular component

Reproduced from best available copy.